

# Electromagnetic Energy ("EME") Site Compliance Report



Prepared for



## Site Information

US ID: 10670

Site Name: P019

Address: 7401 EAST REDFIELD  
SCOTTSDAL, AZ, 85267

Report Date: October 05, 2010

M-RFSC: Robert Hammersmark

17-DR-2011  
1st: 3/21/11



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# 1 Summary

## 1.1 Introduction

AT&T has installed RF transmitting antennas at the following location (the "wireless telecommunications facility"):

**Street Address:** 7401 EAST REDFIELD, SCOTTSDAL, AZ, 85267

**US ID:**10670

**Latitude / Longitude:** 33.61018/-111.91849

Telnet, Inc performed an RF computational analysis of the RF environment surrounding the facilities installed by AT&T at this location. The facility is located on a water tower.

AT&T is licensed by the Federal Communications Commission ("FCC") to provide wireless communications services. As required by the FCC, wireless system operators perform an assessment of the potential human exposure to radio frequency emissions emanating from transmitting antennas at the site.

Antenna specifications presented herein are based on direct evidence from information from the site manager or building manager, information from the licensees, educated estimates by the field technician or a combination of some or all of these sources.

## 1.2 Statement of Compliance

After evaluation of the total RF emission levels from all the operators and a thorough review of the site access procedures, signage and observable antenna locations, Telnet has determined that:

**This site is compliant with FCC Policy.**

AT&T contributes less than 5% of the maximum permissible exposure (MPE) based on theoretical modeling using the parameters supplied by the client.

The compliance determination is based on General Public MPE levels due to predicted and measured levels based on Spatial Averaging, RF signage placement, and the level of restricted access to the antennas at the site.



### 1.3 Safety Recommendations & Site Compliance Actions

This site is compliant with the FCC rules and regulations and further steps must be taken at this time. Since AT&T contributes less than 5% of the MPE, should this site be non-compliant for any reason, all other operators who contribute greater than 5 % would all be liable to bring the site into compliance.

During the field visit, Telnet documented the presence and location of signs and barriers. Areas that require that action in order to meet AT&T corporate policy are listed below. No action means the location is compliant with the company policy.

#### Site Access Locations

No Action required

#### Alpha Sector Location

No Action required)

#### Beta Sector Location

No Action required

#### Gamma Sector Location

No Action required

#### 1.3.1 Lockout/Tagout Procedures for Antenna, Transmission Line and Power Amplifier Maintenance

Whenever anyone is working on an antenna, transmission line, high power amplifier (HPA), or multi-channel power amplifier (MCPA), the transmitter (power amplifier) MUST be turned off. This can be accomplished either locally by flipping a circuit breaker(s) or remotely by command from the NMC/NOC.

The person initiating or requesting the transmitter shutdown is the ONLY person authorized to restore the transmitter to service. This person is responsible for making sure that ALL work has been completed, that ALL cables have been properly reconnected, and that EVERYONE is clear of the work area before the transmitter is reactivated. Generally, this person is considered to be the one actually performing the work. In the case of a contractor working at an active site, the FE/Technician may initiate the request on behalf of the contractor.



### 1.3.2 Lockout/Tagout Procedure, Local Shutdown

After securing permission to shut the transmitter down, the Field Engineer (FE)/Field Technician (FT) will turn off the circuit breaker and verify that the correct transmitter was deactivated. The FE/FT will then place a locking device(s) over the circuit breaker(s) to prevent accidental activation by an unauthorized person and place a TAG on, or in the immediate vicinity of, the circuit breaker(s). The tag should state "Do Not Operate." At the NMC/NOC the same note, including date and time and location, must be entered in the computer or a tag must be placed on the monitor frame in such a manner that the console operator will be made aware that the transmitter can not be activated without permission from the person who initiated the maintenance request.

The FE/FT will turn the key(s) over to the person performing the work. Upon completion of the work, this person performing the task will return the key(s). As a precautionary measure, prior to reactivating the transmitter, the FE/FT MUST verify, to the extent possible, that all connections have been made and that the work area is clear of personnel.

### 1.3.3 Lockout/Tagout Procedure, Remote Shutdown

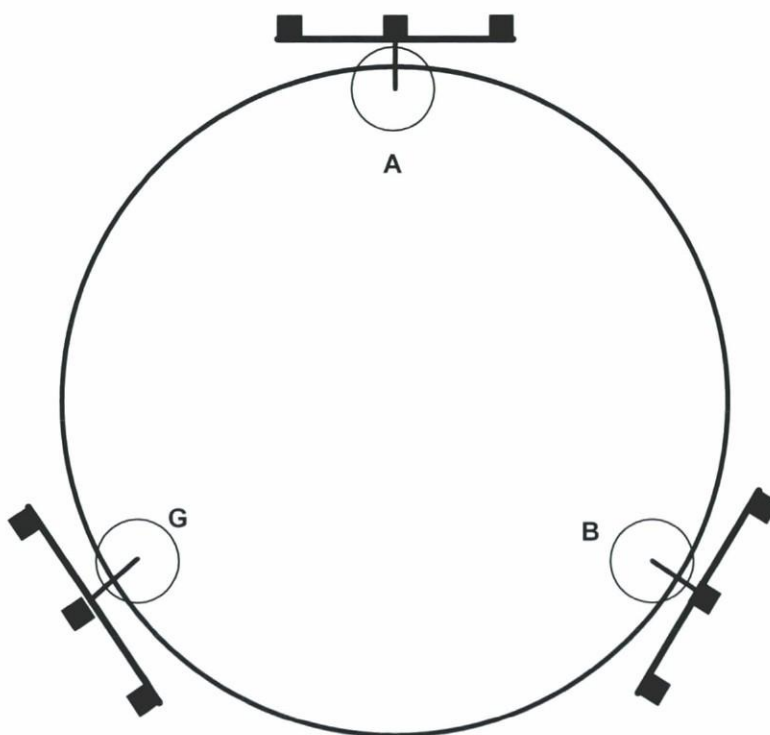
After requesting the NMC/NOC to shut the transmitter down, the FE/FT will verify that the correct transmitter was deactivated. The FE/FT will then place a TAG on or in the immediate vicinity of transmitter. The tag should state "Do Not Operate." At the NMC/NOC the same note, including date/time, must be entered in the computer or a tag must be placed on the monitor frame in such a manner that the console operator will be made aware that the transmitter can not be activated unless the following conditions are met: 1) The tag has been removed by the person performing the work; and 2) Permission is provided by the person who initiated the maintenance request.

Upon completion of the work, the person performing the task will remove the tag and notify the FE/FT that the work is completed. As a precautionary measure, prior to requesting reactivation of the transmitter, the FE/FT MUST verify, to the extent possible, that all connections have been made and that the work area is clear of personnel.

Note: Even though normal procedures call for a remote shutdown, if it is possible to turn off the circuit breaker without causing a software reload or other similar problems the FE/FT should follow the local shut down procedure.



## 1.4 Site Drawing



■ AT&T

Scale

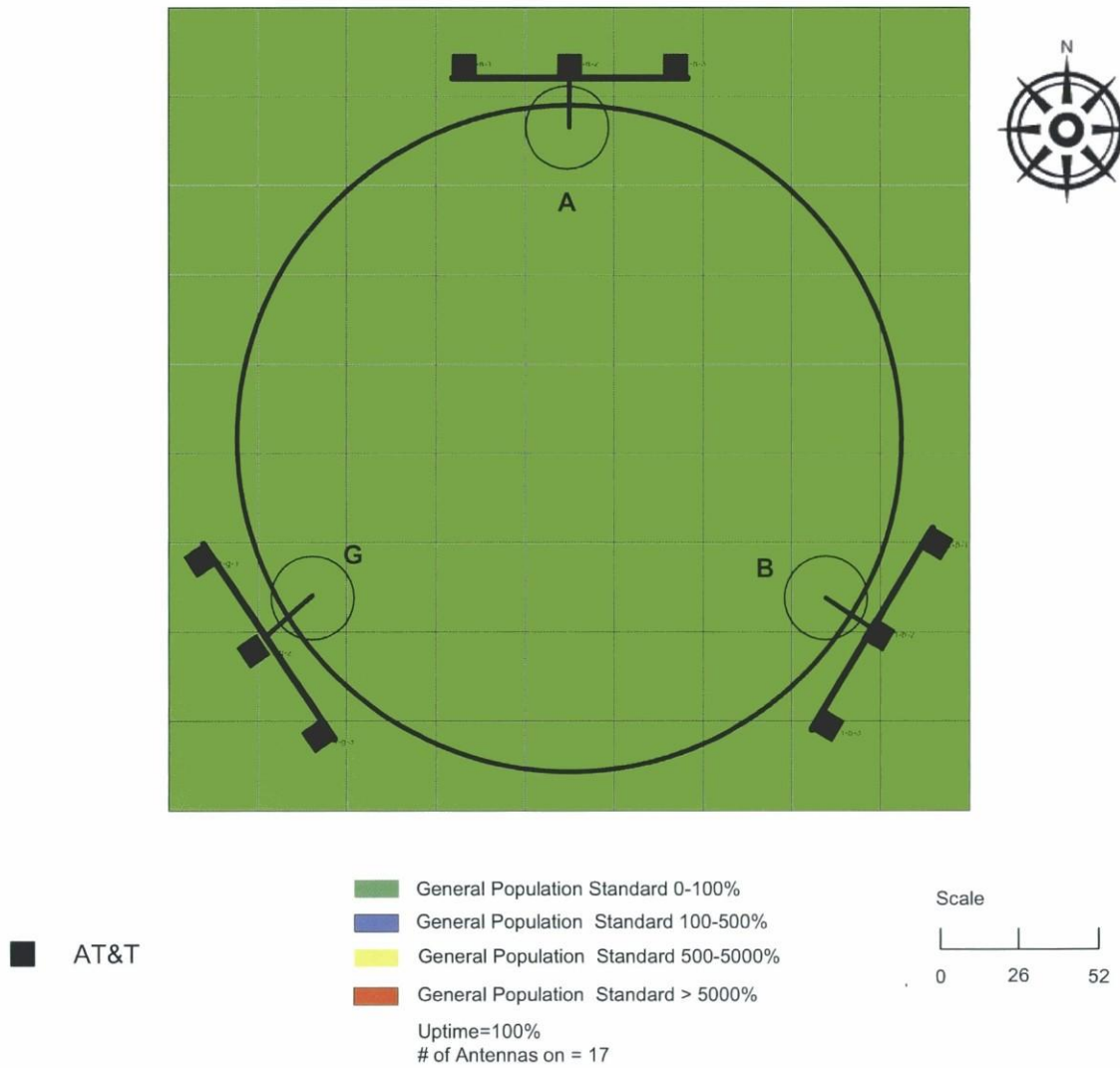


Figure 1

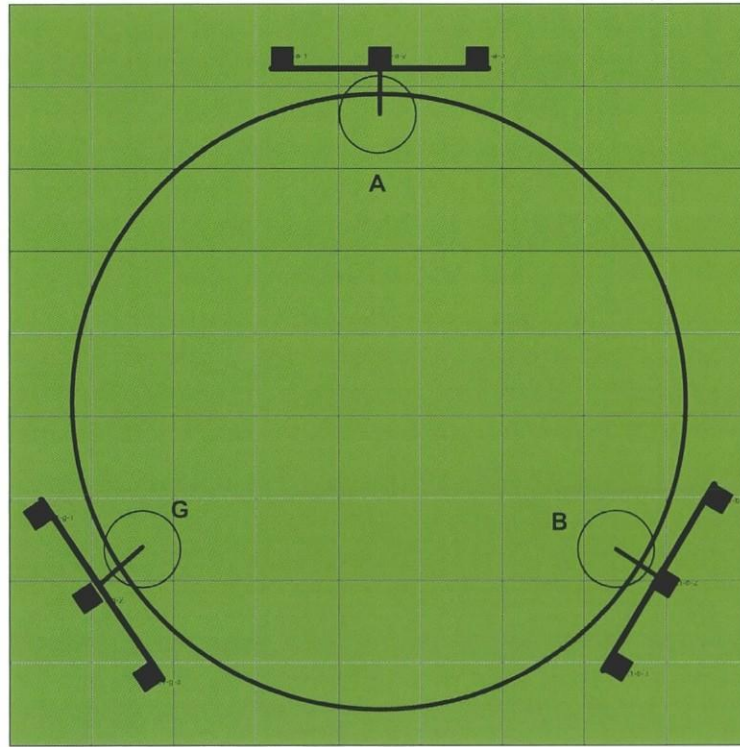


## 1.5 RF Modeling

The modeling calculations assume that the antennas are operating at 100% capacity; that all antenna channels are transmitting simultaneously and that the radio transmitters are operating at full power. Obstructions (trees, buildings etc) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are more conservative (higher) than the actual signal levels will be from the measurement conclusions.

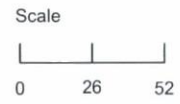


**Figure 1**  
**Percent of FCC General Population Exposure Limit**



■ AT&T

■ General Population Standard 0-5%  
■ General Population Standard >5%  
Uptime=100%  
# of Antennas on = 9



**Figure 2**  
**5% FCC Exposure Limit, AT&T**



## 2 Antenna Inventory

The Antenna Inventory shows all transmitting antennas on the site (see Table 1). This inventory was verified on site and was used by Telnet to perform software modeling of RF emissions. The inventory coincides with the site diagrams on this report, identifying each antenna's location at the site.

For other carriers at the site, the use of "Generic" as an antenna model, or "Unknown" for an operator means the information with regard to the carrier, their FCC license and / or antenna information was not available nor could it be secured while on site. Equipment, antenna models and nominal transmit power were used for modeling, based on past experience with radio service providers.

Relevant administrative and compliance-related information about the antenna site rooftop area is summarized in the table below :

<b>Collocation Status</b>	Not Collocated
<b>Area Classification</b>	General Population



Antenna Number	Operator	Type	TX Freq (MHz)	ERP (Watts)	Gain (dBd)	Model	Azimuth (deg.)	Length (ft)	Horizontal Beamwidth (Deg.)	X	Y	Z
1	AT&T	Panel	1900	1664	16	Andrews UMWD 06516 R2DH	0	4.5	65	33	84	78
2	AT&T	Panel	1900	1664	16	Andrews UMWD 06516 R2DH	0	4.5	65	45	84	78
3	AT&T	Panel	1900	1824	16	Andrews UMWD 06516 R2DH	0	4.5	65	57	84	78
4	AT&T	Panel	1900	1664	16	Andrews UMWD 06516 R2DH	120	4.5	65	86	30	78
5	AT&T	Panel	1900	1664	16	Andrews UMWD 06516 R2DH	120	4.5	65	80	20	78
6	AT&T	Panel	1900	1824	16	Andrews UMWD 06516 R2DH	120	4.5	65	74	9	78
7	AT&T	Panel	1900	1664	16	Andrews UMWD 06516 R2DH	240	4.5	65	4	28	78
8	AT&T	Panel	1900	1664	16	Andrews UMWD 06516 R2DH	240	4.5	65	10	18	78
9	AT&T	Panel	1900	1824	16	Andrews UMWD 06516 R2DH	240	4.5	65	17	8	78

**Table 1  
Antenna Inventory**



### **3 Modeling Summary and Assumptions**

#### **3.1.1 General Model Assumptions**

In this report, it is assumed that all antennas are operating at full power at all times. Software modeling was performed for all transmitting antennas located on the site. Telnet, Inc has further assumed a 100% duty cycle and maximum radiated power.

The site has been modeled with these assumptions to show the maximum RF energy density. Telnet Inc believes this to be a worst case analysis, based on best available data.

If at any time power density measurements were to be made, Telnet Inc believes the real time measurements would indicate levels below those shown in this report. By modeling in this way, we have conservatively shown exclusion areas (areas not to be entered without a personal RF monitor, carriers reducing power or performing real time measurements to show real time exposure levels).

#### **3.1.2 Use of Generic Antennas**

For the purposes of this report, the use of 'Generic' as an antenna model, or 'Unknown' for a wireless carrier, means that the information about the carrier, their FCC license and/ or antenna information was not provided and could not be obtained while on site. In the event of unknown information, Telnet will use our industry specific knowledge of equipment, antenna models and transmit power to model the site. If more specific information can be obtained for the unknown measurement criteria, remodeling of the site is recommended. If no information is available regarding the transmitting service associated with an unidentified antenna, using the antenna manufacturer's published data regarding the antenna's physical characteristics makes more conservative assumptions.



3.1.3 Statistical Summary

Statistical Summary		
%MPE	SQ. FT	%SQ. FT.
	8100	100.00 % of total ROOF Area
0 -100	<b>8100</b>	100.00 % of Selected Area
101 - 500	0	0.00 % of Selected Area
501 - 5000	0	0.00 % of Selected Area
> 5000	0	0.00 % of Selected Area
<b>Roof Area 8100 sq. ft.</b> <b>Max %MPE 0.8 %</b> <b>Min %MPE 0.0 %</b> <b>Using Near/Far Spatial Avg Model</b> <b>With FCC 1997 Public Standard</b>		

Table 4 Percent of FCC General Population Exposure Limit, All carriers

Statistical Summary		
%MPE	SQ. FT	%SQ. FT.
	8100	100.00 % of total ROOF Area
0-5	<b>8100</b>	100.00 % of Selected Area
6 - 500	0	0.00 % of Selected Area
501 - 5000	0	0.00 % of Selected Area
> 5000	0	0.00 % of Selected Area
<b>Roof Area 8100 sq. ft.</b> <b>Max %MPE 0.8 %</b> <b>Min %MPE 0.0 %</b> <b>Using Near/Far Spatial Avg Model</b> <b>With FCC 1997 Public Standard</b>		

Table 5 Percent of FCC General Population Exposure Limit, AT&T



## 4 Analysis and Computation

Based on emission patterns of the antennas at this location most of the energy emitted is spread towards the horizon. This assumes the antennas have a zero downtilt. If a mechanical downtilt other than zero is applied to the antennas then the maximum energy emitted will need to be calculated using the information below.

The following formulas can be used for calculating the power density.

Power density is calculated by dividing the surface area of the sphere or the unit area normal to the direction of the propagation. This information is usually shown in units of microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ), milliwatt per square centimeters ( $\text{mW}/\text{cm}^2$ ), or watts per square meter ( $\text{W}/\text{m}^2$ ).

### 4.1 Analysis

$$S = \frac{(P \times KFact)}{(2\pi Rh)}$$

where :

S = power density ( $\text{mW}/\text{cm}^2$ )

P = total power input to the antenna (mW)

K = antenna correction factor / numeric factor for antenna discrimination

R = straight line distance of the antenna from a 6 ft. human (cm)

h = distance between the roof level and the bottom of the antenna (cm) or the vertical distance from the tip of the antenna to the roof level where a 6 ft. human being is assumed standing directly from the antenna (also equal to R at 0)

MPE% = Calculated exposure level, as a percentage of the FCC MPE limit for continuous exposure of the general population



## 5 FCC Limits for MPE

The FCC guidelines for human exposure to RF electromagnetic fields were derived from the recommendations of two expert organizations, the National Council on Radiation Protection and Measurements ("NCRP") and the Institute of Electrical and Electronics Engineers ("IEEE"). The exposure guidelines are based on thresholds for known adverse effects and they incorporate appropriate margin of safety. The federal health and safety agencies such as: the Environmental Protection Agency ("EPA"), the Food and Drug Administration ("FDA"), the National Institute on Occupational Safety and Health ("NIOSH") and the Occupational Safety and Health Administration ("OSHA") have also been actively involved in monitoring and investigating issues related to RF exposure.

The FCC's MPE limits are based on exposure limits over a wide range of frequencies recommended by the NCRP and the exposure limits developed by the IEEE and adopted by the American National Standards Institute ("ANSI") to replace the 1982 ANSI guidelines. The limits for localized absorption are based on the recommendations of both the ANSI/IEEE and the NCRP. The potential hazard associated with the RF electromagnetic fields is discussed in OET Bulletin No. 56 "Questions and Answers about the Biological Effects and Potential Hazards of RF Electromagnetic Fields". This document can be obtained on the FCC website at <http://www.fcc.gov>.

Sections 7.1, 7.2 and 7.3 represent the FCC limits for both occupational and general population exposures to different radio frequencies:

### 5.1 (A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f <sup>2</sup> )*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6



## 5.2 (B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz

\*Plane-wave equivalent power density

NOTE 1: **Occupational/controlled** limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2: **General population/uncontrolled** exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

## 5.3 Controlled and Uncontrolled Exposure Limits

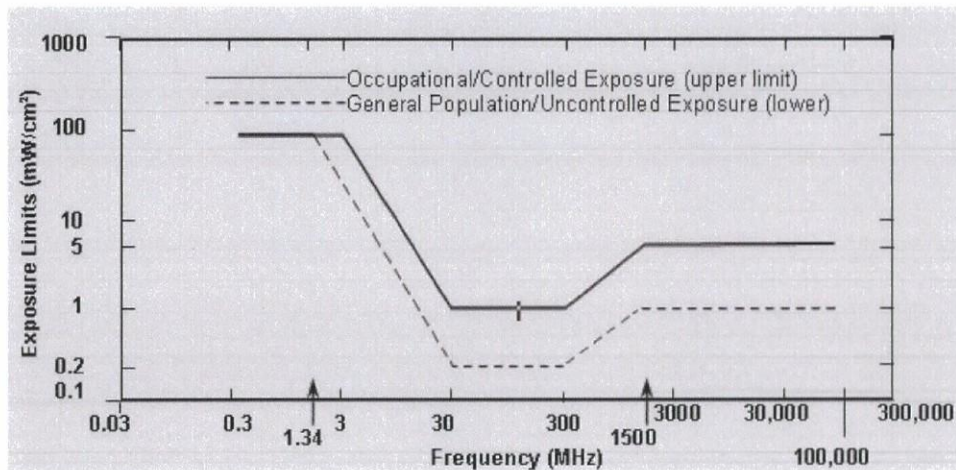


Figure 4



## 6 FCC Standard Certification

This report certifies that the site P019 – 10670 is in compliance with the FCC standard. The analysis and procedure used to provide the report is according to OET Bulletin 65 and other industry standards.

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## 7 Glossary of Terms

1. *Electromagnetic Field (energy density)* – the electromagnetic energy contained in an infinitesimal volume divided by that volume.
2. *Exposure* – Exposure occurs whenever and wherever a person is subjected to electric, magnetic or electromagnetic fields other than those originating from physiological processes in the body and other natural phenomena.
3. *General Population / Uncontrolled Exposure* – applies to human exposure to RF fields when the general public is exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public always fall under this category when exposure is not employment-related.
4. *Maximum Permissible Exposure (MPE)* – the rms and peak electric and magnetic field strength, their squares, or the plane-wave equivalent power densities associated with these fields to which a person may be exposed without harmful effect and with an acceptable safety factor.
5. *Occupational / Controlled Exposure* – applies to human exposure to RF fields when persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/controlled limits.
6. *Power Density (S)* – Power per unit area normal to the direction of propagation, usually expressed in units of watts per square meter ( $W/m^2$ ) or, for convenience, units such as milliwatts per square centimeter ( $mW/cm^2$ ) or microwatts per square centimeter ( $\mu W/cm^2$ ).
7. *Ionization* – a process by which electrons are stripped from atoms and molecules. This process can produce molecular changes that can lead to damage in biological tissue, includes effect on DNA, the genetic material. This process requires interaction with high levels of electromagnetic energy.
8. *Non-ionizing radiation* – a type of emission that is not great enough to cause ionization of atom and molecules. "RF and Microwave Emissions" are low-level energy which are not capable of ionization.